

played a dramatic part in this economic saving, due through experiments on dogs. Daily it is my pleasure to dispense insulin to many prominent and active citizens whose families would suffer not only an economic loss, but companionship and love for many years to come, did we not possess this beneficent research discovery.

Materia medica is a much different subject today than when I studied pharmacy. We pharmacists discuss many new potent drugs with our physicians. Without animal experimentation these new potent and specifics would not be available. Local anesthetics, digitalis derivatives, and heart problems are now fairly well controlled because of proper standardization. Chenopodium has done its part in the elimination of hookworm. Viosterol and our vitamins A, B, C, D, G, and K, are today household words given to parents by the pediatricians. Rickets, malnutrition, and dental problems are daily solved and, here again, largely because of animal standardization. Parents expect the pharmacist to guide them intelligently in their selection of vitamin products.

The pituitary extracts—Are we to be denied their continued use? For only through animal experimentation can the flow of such essential drugs pass from our great pharmaceutical laboratories, hospitals, and pharmacies to mothers, guaranteeing safe childbirth. I can well recall when the strengths of pituitary extract on the market varied from a ratio of one to eighty; what a sigh of relief, therefore, must come to every physician and pharmacist on dispensing potent drugs today, which, because of research on lower animals, standardization is much more exact.

Pharmacists look with optimism into the practically unknown field of endocrinology. Perhaps today we are facing a world of marvelous discoveries yet to be found. Our position in this field is comparable to chemistry about one hundred years ago. Only through animal experimentation can we continue to explore this most fascinating field of medicine that has given us the estrogenic products and the various glandular substances and extracts with which the pharmacist, as well as the physician, must now familiarize himself.

If we are to eradicate cancer, man's most perplexing disease, it will be accomplished, in part, through animal experimentation. Certainly it is not the intention of many of the most intelligent, but misguided citizens, to lend a hand at blocking this humane study. Surely, this group do not ask that cancer be eradicated only by experiments on their brothers and sisters.

We pharmacists have joined hands with the physician, research workers, and public health officials in spreading the gospel of health through constructive educational programs, based on facts of accomplishment. The lives of the pharmacist, Pasteur, and the physician, Jenner, still remain, and should continue, for all of us, guiding stars in overcoming disease in both human beings and the lower animals.

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PROPOSED CALIFORNIA HUMANE POUND LAW: HOW IT WOULD AFFECT MEDICINE AND PHARMACOLOGY*

By CLINTON H. THIENES, M.D.
Los Angeles

DISCUSSION by Fred B. Moor, M.D., Los Angeles.

SIR WILLIAM OSLER makes the statement that, in the more than two thousand years from Hippocrates to Jenner, less was done to emancipate medicine from the routine and thralldom of tradition than was accomplished in the second half of the nineteenth century by experimental medicine.¹ The Hippocrates to Jenner era was one of observation of uncontrolled phenomena of disease. The era since has been characterized by the rise of the experimental method, so ably championed by Claude Bernard seventy-five years ago. What is the experimental method? It is the method of the controlled testing of scientific concepts. The experimental method in medicine requires living beings; that means animals or human beings. Surely, the life or liberty of neither animal nor human being may justifiably be placed in jeopardy unless, by so doing, many more animals and human beings are benefited, and to a great degree. Is this the case?

KNOWLEDGE OF LIVING TISSUE ESSENTIAL

First, let us consider the training of the student of medicine. As a practitioner, he must deal with living tissues. One of the best preparations for this is to learn what living tissue is. To this end he is trained by means of experience with living animals. And the student must learn the mechanisms of drug action. Such functions and mechanisms cannot be taught on the human being nor upon dead men or dead animals, but must be learned through analytical studies on living animals. Such analytical studies usually require operative or painful procedures. Hence, the animals are anesthetized to prevent such pain. If for no other reason than to create in the student a desire to relieve pain the teacher of medical science would see to it that the animal is spared unwarranted suffering. Medical education has advanced with great strides since, and largely because of, the introduction of the experimental method in the teaching laboratory. The use of animals, then, is of great importance for the training of the doctors of the future. But the most impressive value of the use of animals in relation to medicine is in the study and control of disease.

DIPHTHERIA'S DEATH TOLL, HAD THERE BEEN NO ANIMAL EXPERIMENTATION

As examples, I wish to select but a few of many that might be chosen. Let us consider, first, diphtheria. Diphtheria has been largely a disease of children and, in its fatal form, a very painful and terrifying malady, with death by slow suffocation.

In New York City, the average number of deaths per year from diphtheria during the seventeen years 1878 to 1894 was 144 per 100,000 popu-

* Read at a joint meeting of the Los Angeles County Medical Association and the Southern California Retail Druggists Association in Los Angeles on March 17, 1938. See also editorial comment, on page 236.

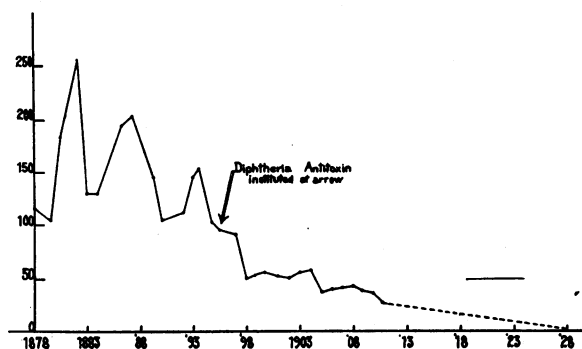


Fig. 1.—Diphtheria mortality 1,000,000 per year (by years).

lation. In 1894, the antitoxin laboratory was established in the city. From 1895 to 1911, which is the first seventeen years after the institution of antitoxin treatment, the yearly average number of deaths was but fifty-four.² Chart 1 indicates the trend during these years. Since 1911 the trend has continued downward, due to more widespread use of antitoxin, earlier diagnosis and immunization of school children; and, according to Park,³ the figure for New York City not long ago was but four per 100,000. All writers consulted state that the mortality among cases treated during the first day of the disease is nil, and that for all treated cases it is less than 9 per cent, while of cases which do not receive antitoxin, over 30 per cent die.

This remarkable decrease in diphtheria mortality would have been impossible without animal experimentation which made the discovery of antitoxin possible, and, furthermore, the preparation of antitoxin today would be impossible without the use of the laboratory animal, which is the source of the antitoxin. All antitoxins and antisera are prepared by injecting the toxin or vaccine into the laboratory animal, usually the horse, and the subsequent bleeding of the animal to secure the serum which contains the antitoxin. Anyone seeing the sleek animals, living in animal luxury, from which blood is periodically drawn in the preparation of the antitoxin, must admit that the animal shows not the slightest evidence of torture.

RABIES: PASTEUR'S BENEFICENT SERVICE TO THE HUMAN RACE

Another infectious disease conquered by animal experimentation and by the use of animals for the preparation of the medicinal material, is rabies (hydrophobia). In all my medical career I have seen but one case of human rabies. This was a child of eighteen months, whose pitiful condition left its image ineradicably in my memory. Figures 2 and 3 show a young man in the terminal stages of rabies. In contrast to this is the instance of a medical colleague of mine who bears many scars from an encounter with a rabid dog, and who has escaped the horrible death by rabies because of the work of Pasteur. Before the institution of the Pasteur treatment, every medical student was familiar with the disease at first hand, because 15 per cent of the victims of rabid dogs succumbed to the disease. Now the Pasteur treatment has reduced the incidence of this universally fatal malady,

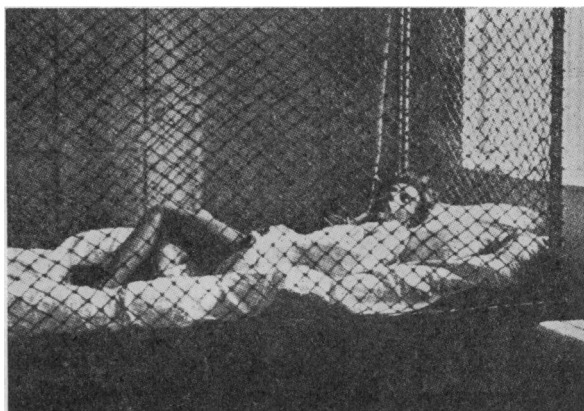


Fig. 2.*—Patient (rabies) in enclosed enclosure. Photograph taken in pause between two attacks. (Difficult breathing, complete exhaustion.)

so that of over five thousand persons in New York City who have been bitten by infected animals, only twenty (0.4 per cent) have died.⁴

Not only are thousands of human lives saved by antirabies treatment, but thousands of valuable or cherished dogs are yearly inoculated with the vaccine either as treatment or as an immunization against hydrophobia.

It is the lowly rabbit which supplies us with the Pasteur vaccine. The virus, which has been attenuated by passing through a series of rabbits, is inoculated into the final rabbit. After a certain time the rabbit is killed and its central nervous system is employed in the preparation of the therapeutic vaccine.

Who is there among you who would care to weigh the life of a child or of an adult person against that of a rabbit? And who among you can call it cruelty to sacrifice the animals for such purposes?



Fig. 3.*—Invalid during an attack of hydrophobia. Anxious, distressed expression of countenance, fixed gaze, divergent strabismus, laryngeal spasm.

* Figures 1 and 2 taken from monograph "Lyssa bei Mensch und Tier" by R. Kraus, F. Gerlach und F. Schweinburg. Published by Urban und Schwarzenberg, Berlin and Wien, 1926.

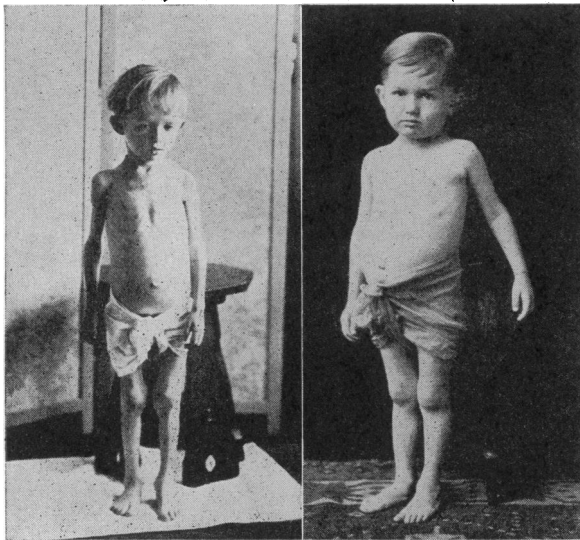


Fig. 4.—Diabetic child on admission to the clinic before treatment.

Fig. 5.—The same child as in Fig. 4, one month after treatment with insulin.

DIABETES: ITS MORTALITY RATES IN FORMER AND PRESENT DAYS

A third condition in which thousands of lives have been saved by animal experimentation is diabetes mellitus. Most of you remember the pre-insulin days. Diabetes was one of the dreaded diseases. In the young it was rapidly fatal. Few children lived more than a year after the onset of the disease, and the average length of life of a twenty-year-old patient was two years or less. What miserable folk they were: thin, weak, sallow, cold, hungry and thirsty, waiting for death (Figure 4). Today a diabetic can live a nearly normal life, except for the carefully adjusted diet and the daily injections of insulin. His life expectancy is almost that of a nondiabetic. This change in affairs has come about through animal experimentation and would have been impossible otherwise.

In Figure 5 we see the same child as in Figure 4, just thirty-four days after insulin treatment was begun. The photograph shown in Figure 6 is of a group of children at a local diabetic Children's Clinic in 1927. Today two of the girls are mothers, one of the boys is an assistant professor of chemistry and, except for a boy who died of bone sarcoma and a girl who died of lung abscess, all are living useful lives. Without insulin, none of these children would be alive today.*

The dog has been the only animal that could be transformed into a chronic diabetic for the careful study of the various factors in diabetes mellitus and for the study of the actions of insulin in the diabetic animal.

You may say that we have now gained so much knowledge of diabetes that further sacrifice of animals is unwarranted. But if the use of animals for scientific purposes were to cease, insulin standardization would be impossible, for we have no chemical criteria for its assay. Thousands of rab-

* We are indebted to Drs. Bernard Smith and Howard F. West, of Los Angeles, for these photographs.



Fig. 6.—Group of diabetic children (after treatment with insulin). Photograph taken in 1927.

bits are necessary for the determination of the potency of the various batches of insulin prepared in this country. Insulin is a very potent material, and its dose must be accurately adjusted to the needs of the individual patient. Without standardization of potency, a patient might either be excreting large amounts of sugar, or be in a state of insulin shock. An overdose of insulin can be a very dangerous episode in the life of the diabetic patient. First judgment, then muscle control, then consciousness is lost, and convulsions supervene. Patients would not dare venture out of doors if they could not feel reasonably sure of a given volume of insulin solution producing a uniform effect. This uniformity of effect could not be without animal control of the insulin potency.

SMALLPOX, LOCKJAW, BUBONIC PLAGUE, SYPHILIS, AND OTHER DISEASES

I have mentioned but three of the triumphs of experimental medicine. I could tell you of the conquering of smallpox, lockjaw, plague, and syphilis; of great advances in our knowledge of infantile paralysis, tuberculosis, and pneumonia. I could relate recent experiments which seem to open wide the gate that has kept us in ignorance of the mechanism of high blood pressure. I could show how animals are indispensable for the establishment of the mechanisms of drug action and for the control of the potency of digitalis, ergot, pituitary extract, and many other potent drugs. How, also, the new anesthetics, ethylene and cyclopropane, were discovered through animal experiments; and how this marvelous new drug, sulfanilamid, which is doing such remarkable things in the treatment of child-bed fever, streptococcus wound infections, and acute epidemic meningitis, was first brought to

light by tests on animals. But because neither my time nor your patience permits this, I must content myself with presenting a prophetic picture. Until we learned how to produce cancer in experimental animals, we learned but little about the characteristics of malignant tumors. Then it was learned that tar cancer could be produced in rabbits, that a tumorous growth could be initiated in fowl by the injection of a specific virus, and that spontaneous tumors could be transplanted from one animal to another. This led to the discovery of the carcinogenic sterols, to the discovery of genetic control of experimental cancer and, finally, to the rôle of the hypophysis and of the ovary, in the regulation of the growth and incidence of experimental malignant tumors. If one may forecast the future, on the basis of past experience, one may feel justified in believing that, before long, through animal experimentation, this disease of old age may be conquered. Having conquered many of the diseases of youth, we lengthen life into that era where cancer and circulatory disease take their toll. Most of those in this room will fall victim to one or the other. We are well on the way to understanding both through animal experimentation. We must not turn back. We must not even stand still. We must go forward.

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DISCUSSION

FRED B. MOOR, M.D. (White Memorial Hospital, Los Angeles).—Doctor Thienes has presented to you a most convincing argument for the humane use of animals in the study of disease, the development of biological remedies, and the elucidation and standardization of drug action. It seems incredible that any but the most uninformed or wilfully ignorant would seek to impede medical progress in the life and death struggle with devastating diseases.

Although the past fifty years have witnessed wonderful progress in the control and treatment of disease by the aid of animal experimentation, medical frontiers are not yet abolished. New regions are constantly opening up, for example, the rapidly developing fields of nutrition and endocrinology, both of which require the use of animals in the solution of a multitude of unsolved problems. The discovery that nicotinic acid produces a most spectacular cure of pellagra arose from the observation that it relieved the black tongue disease of dogs. This discovery benefits both dogs and men, as do many of the results of animal experimentation. The control of pernicious anemia by the use of specific liver and stomach extracts had its foundation in the fundamental observation of Whipple that liver-feeding was especially effective in curing experimental anemia in dogs. As Doctor Thienes has intimated, one can continue indefinitely enumerating steps in medical progress which have been based directly or indirectly upon animal experimentation.

Let us suppose for a moment that the dreams and desires of certain well-meaning but misguided people could be realized, and that all animal experimentation could be abolished. Smallpox would again become epidemic as it has been in the past, and as it is occasionally still in some unvaccinated populations. Diphtheria would again become a prevalent disease and would exact a death toll of 30 per cent of its

youthful victims. Typhoid fever and tetanus would again ravage our armies in time of war. Diabetics would again be consigned to their miserable state of preinsulin days. The mortality, which in nearly half of all lobar pneumonias can be reduced by specific serum to 10 to 20 per cent, would again rise to from 30 to 40 per cent. As Doctor Thienes has pointed out, we would be forced to use certain drugs of unstandardized potency. I was told recently that our local health department, most of the time, has under treatment several persons who have been bitten by rabid dogs. Without the Pasteur treatment these individuals would be waiting in awful suspense wondering if and when symptoms of rabies might appear, and when they did appear if nothing could be done about it. Our children would be exposed daily to attacks of rabid animals; and even the very animals which the proposed so-called Humane Pound Law seeks to protect would be in danger of much worse suffering than being painlessly put to sleep in an experimental laboratory with an anesthetic, to serve a merciful purpose in the study of means for relief of both animal and human disease.

Such would be the situation if we were denied the use of animals for experimental purposes. Surely, the people of California, if they knew the truth, would not desire even to take this first step in the abolition of the use of animals in experimental studies which will save the lives of their children.

FEDERAL AND STATE NARCOTIC LAWS: CAUTIONS FOR PHYSICIANS*

By WILLIAM R. MOLONY, SR., M.D.
Los Angeles

A BRIEF outline of major points on the narcotic laws include items such as follow:

The narcotic regulations that affect the physicians and surgeons of California come from two sources, namely, the Federal (Harrison Narcotic Law) and the State (Division of Narcotic Enforcement Government). It is quite important that each practicing licensed physician be familiar with the basic regulations of these laws.

At the present writing there are about one hundred licensed men under probation from the Board of Medical Examiners, and at least 75 per cent of these may trace their trouble to a violation of these narcotic laws.

Occasionally we find that a doctor gets into difficulty through carelessness or a misguided desire to help out an "addict" in his misery; but most of the cases develop from a deliberate violation of these laws, either in prescribing for a fee or the sale of narcotics to "addicts." No good ever comes from these practices, and the sooner our physicians stop writing for these habitual users the better off they will be.

A habitual user may be one who started with or still has a definite pathology; but no "pathology" requires 15 to 20 grains of morphin a day. The most severe type of pain is ordinarily controlled by a grain of morphin, and the balance of the daily dose is simply to satisfy the addiction.

The agents of the Federal and State narcotic enforcement divisions are anxious to coöperate with the medical profession. In most cases, after an investigation they settle the case with a word of caution, and an explanation of the law. It is only the doctor who is a "repeater" and one who is writing for "addicts" or selling narcotics who is arrested and punished.

* See also editorial comment, on page 236.